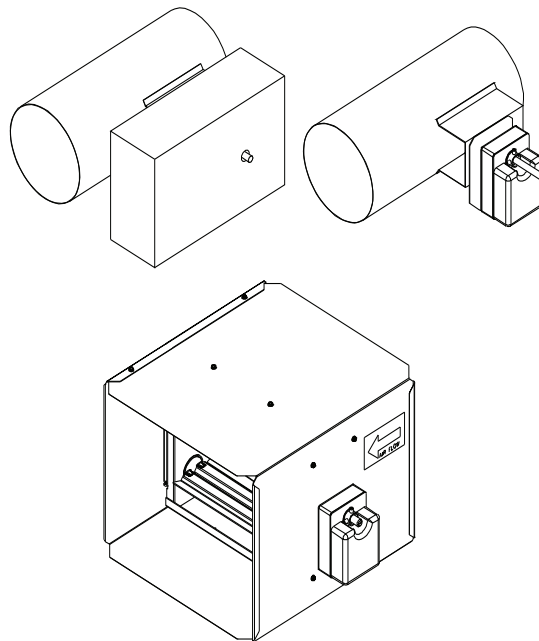




Installation Guide

VariTrac™ Dampers



SAFETY WARNING

Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of heating, ventilating, and air-conditioning equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment.





Warnings, Cautions and Notices

Warnings, Cautions and Notices. Note that warnings, cautions and notices appear at appropriate intervals throughout this manual. Warnings are provided to alert installing contractors to potential hazards that could result in personal injury or death. Cautions are designed to alert personnel to hazardous situations that could result in personal injury, while notices indicate a situation that could result in equipment or property-damage-only accidents.

Your personal safety and the proper operation of this machine depend upon the strict observance of these precautions.

ATTENTION: Warnings, Cautions and Notices appear at appropriate sections throughout this literature. Read these carefully.

 **WARNING:** Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

 **CAUTION:** Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It could also be used to alert against unsafe practices.

NOTICE: Indicates a situation that could result in equipment or property-damage-only accidents.

WARNING

Personal Protective Equipment (PPE) Required!

Installing/servicing this unit could result in exposure to electrical, mechanical and chemical hazards.

- Before installing/servicing this unit, technicians **MUST** put on all Personal Protective Equipment (PPE) recommended for the work being undertaken. **ALWAYS** refer to appropriate MSDS sheets and OSHA guidelines for proper PPE.
- When working with or around hazardous chemicals, **ALWAYS** refer to appropriate MSDS and OSHA guidelines for information on allowable personal exposure levels, proper respiratory protection and handling recommendations.
- If there is a risk of arc or flash, technicians **MUST** put on all Personal Protective Equipment (PPE) in accordance with NFPA70E or other country-specific requirements for arc/flash protection **PRIOR** to servicing the unit.

Failure to follow recommendations could result in death or serious injury.

WARNING

Proper Field Wiring and Grounding Required!

All field wiring **MUST** be performed by qualified personnel. Improperly installed and grounded field wiring poses **FIRE** and **ELECTROCUTION** hazards. To avoid these hazards, you **MUST** follow requirements for field wiring installation and grounding as described in NEC and your local/state electrical codes. Failure to follow codes could result in death or serious injury.

Overview of Manual

Note: *At least one copy of this document ships with every order and is customer property. It must be retained by the unit's maintenance personnel.*

This booklet describes proper installation procedures for delivered air systems. By carefully reviewing the information within this manual and following the instructions, the risk of improper operation and/or component damage will be minimized. It is important that periodic maintenance be performed to help assure trouble free operation. Should equipment failure occur, contact a qualified service organization with qualified, experienced HVAC technicians to properly diagnose and repair this equipment.

General

These instructions do not cover all variations in systems nor provide for every possible contingency that may arise at a job site installation.

Inspection

Check carefully for any shipping damage. This must be reported to and claims made against the transportation company immediately. Any missing parts should be reported to your supplier at once and replaced with authorized parts only.

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General

Damper Descriptions & Actuator Specifications

Round Dampers

Cylinder: 18-gage galvanized-rolled and seam welded

Damper: Two 22-gage galvanized steel plates locked together with an elastomeric gasket sandwiched between.

Actuator: Internal actuator w/synchronous motor and gear reduction is direct coupled to the damper shaft. It has a drive time of 60 seconds.

- **Electrical Rating:**

- Power Supply—24 VAC (20 to 30 VAC) at 50/60 Hz
- Transformer Sizing—2.0 VA maximum at nominal voltage, Class 2

Table 1. Round bypass dampers

Size Diameter (in.)	Length (in.)	Shipping Weight
6	17	17 lbs
8	17	19 lbs
10	17	20 lbs
12	17	21 lbs
14	17	23 lbs
16	17	25 lbs

Table 2. Round zone dampers

Size Diameter (in.)	Length (in.)	Shipping Weight
6	17	19 lbs
8	17	21 lbs
10	17	22 lbs
12	17	23 lbs
14	17	25 lbs
16	17	27 lbs

Rectangular Bypass Damper

Sheet Metal Box: 22-gage galvanized steel

Length: 16"

Damper Frame: 18-gage galvanized steel

Damper Blades: 18-gage galvanized steel

Damper Shaft: 1/2" Diam.

Table 3. Rectangular bypass dampers

Size W" x H"	No. of Blades	Shipping Weight
14 x 12	3	16 lbs
16 x 16	4	21 lbs
20 x 20	4	29 lbs
30 x 20	4	40 lbs

Rectangular Zone Damper

Sheet Metal Box: 22-gage galvanized steel

Length: 16"

Damper Frame: 18-gage galvanized steel

Damper Blades: 18-gage galvanized steel

Crank Bearings: Glass filled Nylon

Damper Shaft: 1/2" Diam.

Table 4. Rectangular zone dampers

Size H" x W"	No. of Blades	Shipping Weight
08 x 12	2	8 lbs
08 x 14	2	10 lbs
08 x 16	2	12 lbs
10 x 16	2	14 lbs
10 x 20	2	16 lbs
14 x 18	3	18 lbs

Actuator Specification

Actuator Design: 3 Wire 18 ga 24 VAC Floating Point Control, Non-spring return

Actuator Housing: Housing Type—NEMA 1, IP20

Shaft Rotation: All damper shafts rotate counter-clockwise to open

Electrical Rating:

- Power Supply—24 VAC (20 to 30 VAC) at 50/60 Hz
- Transformer Sizing—2.5 VA maximum at nominal voltage, Class 2

Manual Override: External release lever

Humidity: 90% RH maximum, non-condensing

Temperature Rating:

- Ambient – 35°–125°F (2°–52°C)
- Shipping and Storage: -20°–150°F (-29°–66°C)

Torque:

- Running: 35 lb-in (4 N-m)
- Breakaway: 35 lb-in (4 N-m) minimum
- Stall: 40 lb-in (4.5 N-m) minimum

Running Time for 90° Rotation:

- 60 seconds at 60 Hz nominal
- 72 seconds at 50 Hz nominal

Weight: 1.5 lb (0.68 kg)

Install Bypass Dampers

Bypass damper(s) should be located before the first zone runs out from the supply air duct. VariTrac dampers or supply duct branches should be installed downstream of bypass dampers. The distance between bypass dampers and the communicating sensor/bypass control should be two to three equivalent duct diameters (see [Figure 1, p. 7](#)).

In systems with plenum return, bypass damper(s) should be ducted into the return air riser. Confirm that sufficient relief or exhaust exists to prevent return plenum pressurization.

Important: *The use of a relief fan or backdraft damper is strongly recommended in the return air system. This will prevent bypassed air from pressurizing the return air duct system and spilling out of return grills into conditioned space, especially when the unit is in economizer mode.*

Bypass Damper Wiring

WARNING

Proper Field Wiring and Grounding Required!

All field wiring **MUST** be performed by qualified personnel. Improperly installed and grounded field wiring poses **FIRE** and **ELECTROCUTION** hazards. To avoid these hazards, you **MUST** follow requirements for field wiring installation and grounding as described in NEC and your local/state electrical codes. Failure to follow code could result in death or serious injury.

WARNING

Hazardous Voltage!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

The interconnect cable is pre-wired to the bypass damper and may be lengthened if necessary.

Important: *Mounting screws must be located towards the ends of the damper when hanging straps are used to avoid interference with the rotating damper. A label attached to the dampers indicates the acceptable areas for mounting screws.*

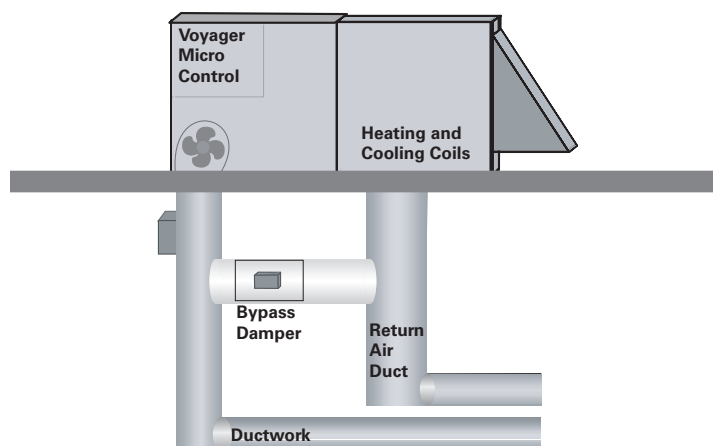
NOTICE

Equipment Damage!

The bypass damper must be positioned to orient the drive shaft horizontally. Failure to do this could result in drive train malfunction (see [Figure 1, p. 7](#)).

Important: *It is important to note the airflow direction when installing dampers. A label for this is present on each damper assembly.*

Figure 1. Bypass damper installation



Installation

Installing the Communicating Sensor/Bypass Control

⚠ WARNING

Hazardous Voltage!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

The communicating sensor/bypass control is located between the supply fan and the bypass damper in the least turbulent location possible. It is recommended that the distance between the control and the nearest upstream transition be two to three equivalent duct diameters.

If the supply duct branches out at the riser, install the control in the largest supply duct.

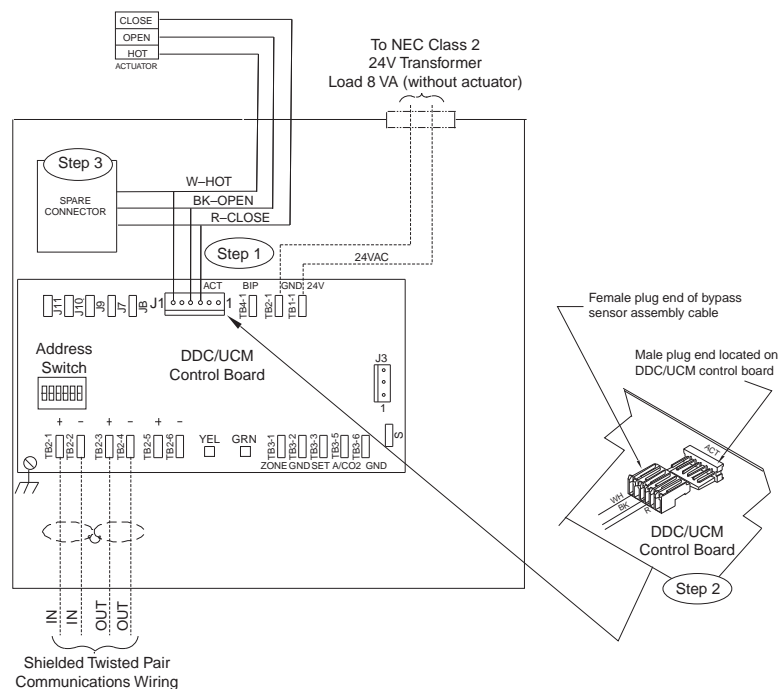
A two-inch hole is required to insert the temperature and static pressure sensor. Use the supplied gasket to seal off air leaks. Secure the sensor to the duct with a minimum of three sheet metal screws.

Important: The sensor assembly should be installed on the side of the duct to keep the pressure transducer in a vertical orientation. Do not install horizontally on the top or bottom of a duct.

Note: Each of the three steps below may be found illustrated in [Figure 2, p. 8](#). Each step has a corresponding oval in the figure.

1. Plug the actuator connector from the BYPS damper onto the master damper UCM socket (ACT).
2. If two bypass dampers are used, connect the actuator plug of the second bypass damper to the spare connector socket pigtailed on the first BYPS damper cable assembly.
3. If the cable assembly needs to be extended, cut and splice additional wire on the BYPS damper end of the cable.

Figure 2. Installing the communicating sensor/bypass control



Connect the Communicating Sensor/Bypass Control Wiring

WARNING

Proper Field Wiring and Grounding Required!

All field wiring **MUST** be performed by qualified personnel. Improperly installed and grounded field wiring poses **FIRE** and **ELECTROCUTION** hazards. To avoid these hazards, you **MUST** follow requirements for field wiring installation and grounding as described in NEC and your local/state electrical codes. Failure to follow code could result in death or serious injury.

The pre-wired interconnect cable plugs into the actuator connector inside the control box. The cable is designed to connect in one orientation only. Refer to the VariTrac Changeover Bypass VAV Literature (VAV-PRC003-EN) for information regarding system wiring.

Install the VariTrac Dampers

A sketch of basic damper installation is shown in [Figure 4, p. 10](#). The damper may be connected with hard duct or flex duct at either end.

If two bypass dampers are installed, a pigtail socket is provided on the cable so the second damper can be plugged into the UCM.

Important: *Mounting screws must be located towards the ends of the damper when hanging straps are used to avoid interference with the rotating damper. A label attached to the dampers indicates the acceptable areas for mounting screws.*

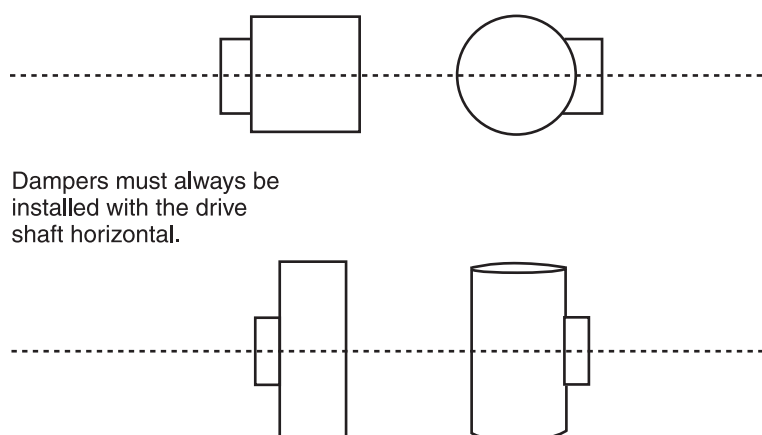
Important: *It is important to note airflow direction when installing the damper. A label for this is present on each damper assembly.*

NOTICE

Equipment Damage!

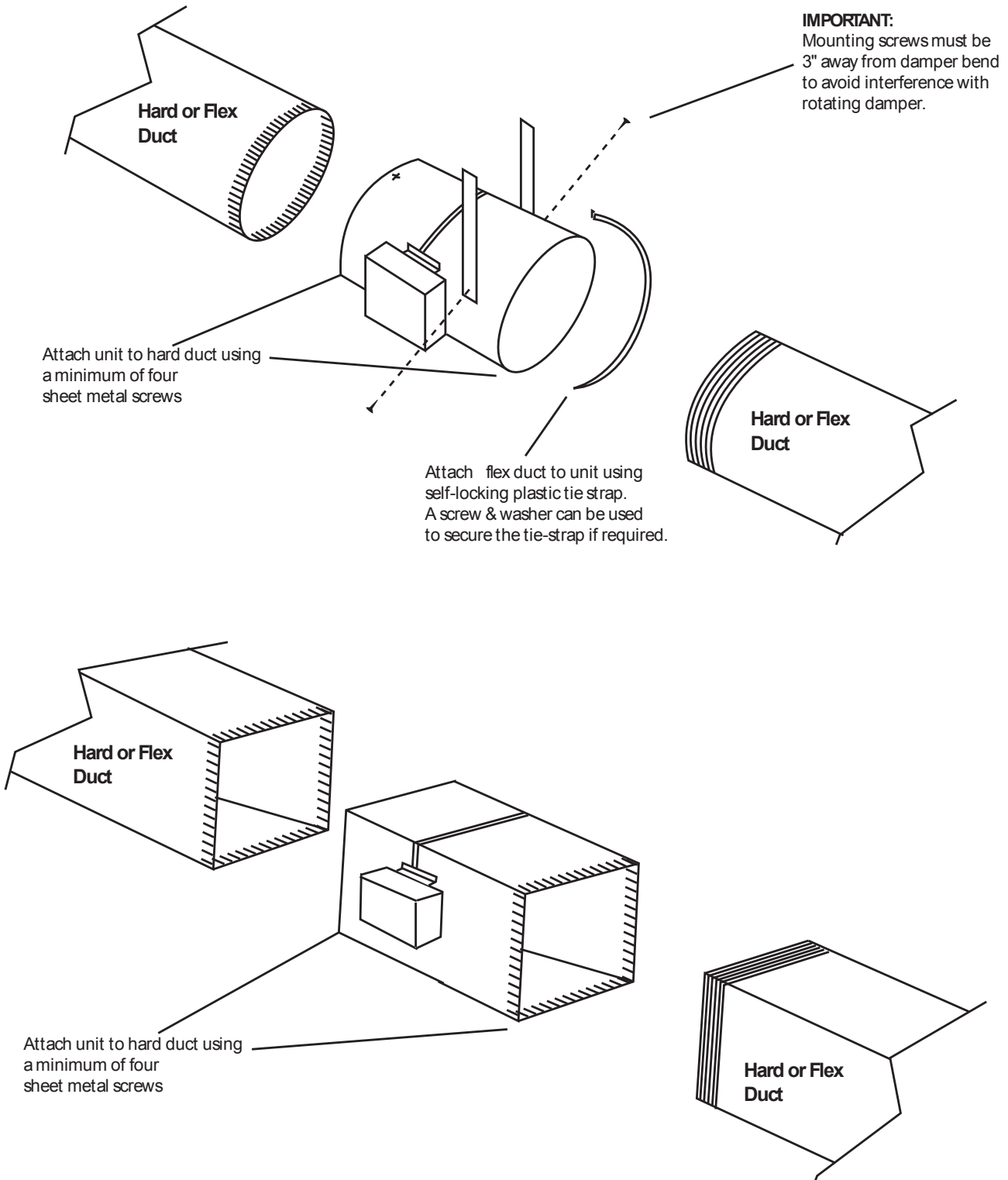
The control box on each damper must be positioned to orient the drive shaft horizontally. Failure to do this could result in drive train malfunction. (See [Figure 3, p. 9](#).)

Figure 3. Proper damper mounting positions



Installation

Figure 4. VariTrac damper installation



Connect UCM Wiring

WARNING

Proper Field Wiring and Grounding Required!

All field wiring **MUST** be performed by qualified personnel. Improperly installed and grounded field wiring poses **FIRE** and **ELECTROCUTION** hazards. To avoid these hazards, you **MUST** follow requirements for field wiring installation and grounding as described in NEC and your local/state electrical codes. Failure to follow code could result in death or serious injury.

CAUTION

Live Electrical Components!

During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in minor to moderate injury.

NOTICE

Use Copper Conductors Only!

Unit terminals are not designed to accept other types of conductors. Failure to use copper conductors could result in equipment damage.

NOTICE

Equipment Damage!

Connecting a shared UCM power supply with reversed polarity will cause damage to the UCM, TCI, and central control panel.

NOTICE

Equipment Damage!

When powering multiple UCMs from one transformer, polarity must be maintained. Terminal TB1-1 is designated positive (+) and Terminal TB1-2 is negative (–) to unit casing ground.

Important: *UCM control box cover must be replaced after field wiring to prevent electromagnetic interference.*

1. Connect the power to terminals TB1-1 (24V) and TB1-2 (ground). 24 Vac is required to power the UCM control. 20 Vac to 28 Vac is acceptable. Use 18 to 20 AWG for power wiring.
2. The power consumption for an auto-changeover cooling-only UCM (model CHGR) is 10VA.
3. Local heat outputs are rated at 12VA maximum for each output. To determine the total UCM power requirements, add the power consumption of local heat to the circuit board power.

DIP Switch Settings

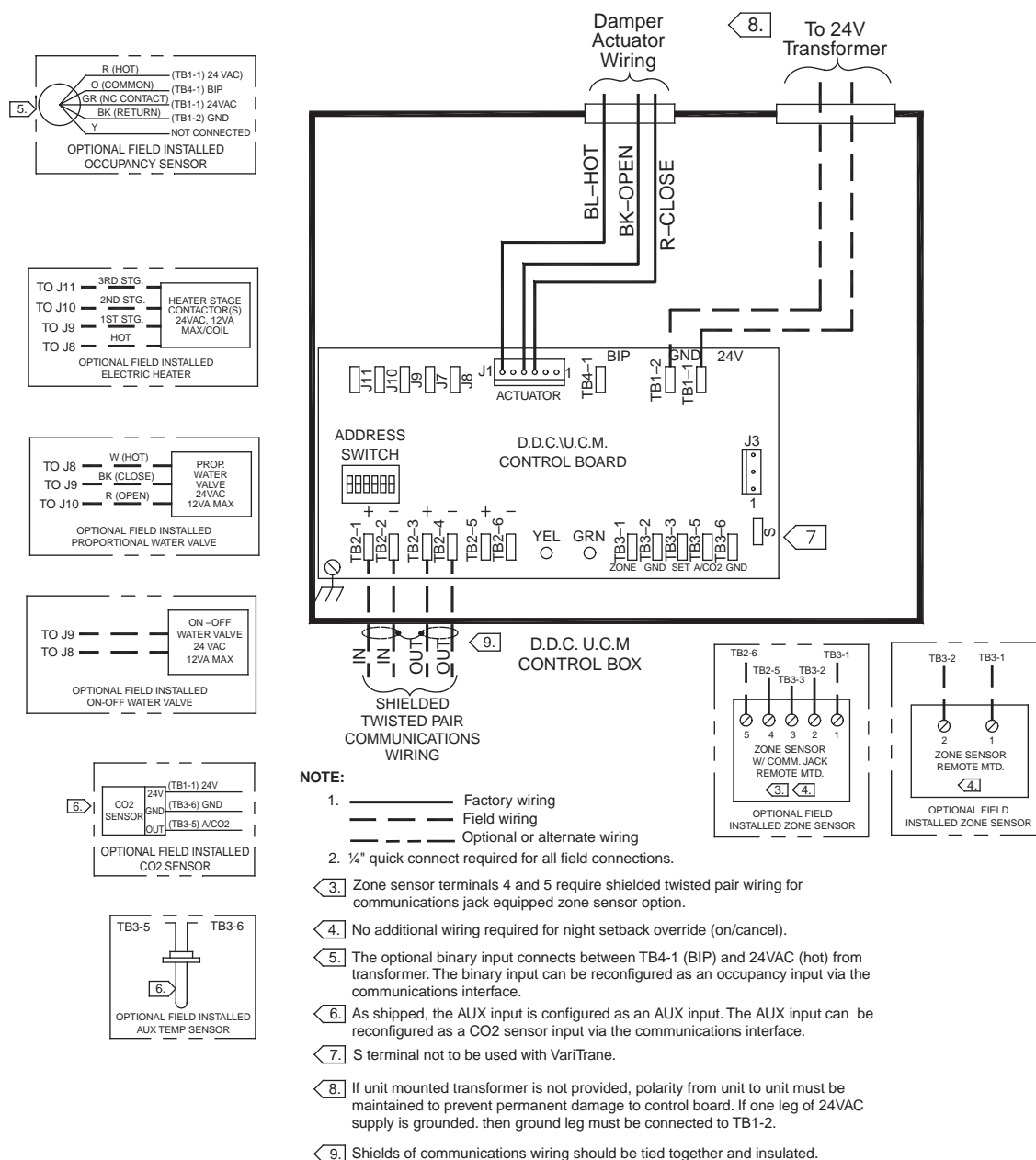
Dip switch SW1 contains six switches for addressing the UCM. These switches allow a user to set a unique communication address for each UCM. Each UCM on a given communication link must have a unique address in order for the CCP to communicate to it. Refer to [Table 5, p. 12](#) for UCM 4.1 DIP switch settings.

Table 5. DIP switch settings

UCM Unit #	Dip 1	Dip 2	Dip 3	Dip 4	Dip 5	Dip 6
1	OFF	ON	ON	ON	ON	ON
2	ON	OFF	ON	ON	ON	ON
3	OFF	OFF	ON	ON	ON	ON
4	ON	ON	OFF	ON	ON	ON
5	OFF	ON	OFF	ON	ON	ON
6	ON	OFF	OFF	ON	ON	ON
7	OFF	OFF	OFF	ON	ON	ON
8	ON	ON	ON	OFF	ON	ON
9	OFF	ON	ON	OFF	ON	ON
10	ON	OFF	ON	OFF	ON	ON
11	OFF	OFF	ON	OFF	ON	ON
12	ON	ON	OFF	OFF	ON	ON
13	OFF	ON	OFF	OFF	ON	ON
14	ON	OFF	OFF	OFF	ON	ON
15	OFF	OFF	OFF	OFF	ON	ON
16	ON	ON	ON	ON	OFF	ON
17	OFF	ON	ON	ON	OFF	ON
18	ON	OFF	ON	ON	OFF	ON
19	OFF	OFF	ON	ON	OFF	ON
20	ON	ON	OFF	ON	OFF	ON
21	OFF	ON	OFF	ON	OFF	ON
22	ON	OFF	OFF	ON	OFF	ON
23	OFF	OFF	OFF	ON	OFF	ON
24	ON	ON	ON	OFF	OFF	ON
33 ^(a)	OFF	ON	ON	ON	ON	OFF

(a) Bypass damper must always be addressed at 33.

Figure 5. Typical VariTrac Zone/Changeover Wiring Diagram.





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